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(54) PRODUCTION OF RUBBER GLOVES

(71) We, L R INDUSTRIES LIMITED, a British Company, of North Circular Road, Chingford, London, E.4, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention is concerned with the manufacture of rubber gloves.

Rubber gloves are conventionally made by latex dipping. This process typically comprises dipping a preheated glove former into a bath of rubber latex coagulating agent, usually an aqueous solution of calcium nitrate, removing the former and allowing the coagulating agent to dry, dipping the former into a bath of rubber latex, removing the former, and then drying, leaching and vulcanising the resulting rubber coating on the former. After completion of vulcanisation and subsequent cooling, the glove is stripped from the former. This process is normally operated to produce a glove having a substantially uniform thickness.

There is a requirement, however, for users such as surgeons, for rubber gloves that have a greater thickness in the wrist and gauntlet area or in the cuff area than in the finger and hand portions. Such gloves give the required sensitivity in the finger and hand portion and improved strength in the thicker portion.

Processes have been described for making rubber gloves comprising areas of different thicknesses, but these processes give gloves in which there is a relatively abrupt change in thickness between a thicker portion and a thinner portion and there is a tendency for such gloves to tear at the line of thickness change when being donned by a wearer because of the stress concentration at this line. We have now developed an improved process for making such gloves comprising areas of different thicknesses, which process comprises dipping a glove former into a bath of rubber latex coagulant so as to coat the whole of the former with coagulant, removing the the former and allowing the coagulant to dry, applying additional coagulant to the areas of the former corresponding to the glove areas in which increased thickness is required and allowing this coagulant to dry, the steps of applying additional coagulant and drying this coagulant being carried out while rotating the former about its longitudinal axis, and then dipping the whole former in a bath of rubber latex.

The additional coagulant may be the same as or different from, but compatible with, the coagulant used for the first dipping operation. In either case the effect of the combined coatings in the selected areas is to provide a heavier latex concentration in these areas when the former is dipped in the latex bath, leading to increased rubber thickness in the finished glove. We have found that by rotating the former during application and drying of the additional coagulant, the two applications of coagulant blend together to give a relatively gradual change in the amount of coagulant in the zone between the treated and untreated areas and, hence there is a relatively gradual change in the final rubber thickness, rather than a pronounced step.

This procedure is particularly well suited for use in conjunction with the apparatus described in our Specification No. 911,654 which comprises, inter alia, means for rotating and altering the angular attitude of glove formers in a continuously operated latex dipping line. A preferred form of our novel process, in which it is carried out using apparatus as described in our said specification, will now be described in greater detail, by way of example.

Glove formers, mounted as described in our said specification, and preferably formed of porcelain, are preheated by any suitable means to a temperature of from 60° to 80°C and each is then dipped into a coagulant bath consisting typically of a 15% by weight aqueous solution of calcium nitrate which is preheated to a temperature of from 55° to 80°C.

After withdrawal from the coagulant bath, the former is rotated about its suspension

point to bring its longitudinal axis horizontal or vertical with the fingers upwards or to any intermediate disposition therebetween and in the chosen attitude it is rotated about its longitudinal axis at an appropriate speed, which is usually from 5 to 6 revolutions per minute, to effect even distribution of the accumulation of deposit on the tips of the fingers and thumb and evaporation of the water, due to the temperature of the former, to leave a dry coating of calcium nitrate.

When the coagulant coating has dried to a suitable extent, and while rotating the former as before, a second application of liquid coagulant is applied by spray or brush or pad or any other convenient method to the part of the wrist and gauntlet area which is required to have a thicker film of rubber in the finished glove. This coagulant may be the same as that used for the first coagulant dipping operation, that is a 15% solution, the greater rubber thickness in this case being due to the greater quantity of coagulant deposited. Alternatively it may be of stronger concentration, for example up to 50% by weight, if a substantially heavier rubber thickness is required.

As the second application of coagulant is made, blending and amalgamation of the two coatings takes the place so that at the limits of the area of the second coating there is a gradual change in the amount of coagulant so that the finished glove does not show a pronounced demarcation line between the dip coated and overcoated areas of coagulant.

When the second coagulant coating is completed and sufficiently dry, rotation of the former about its longitudinal axis is stopped and the former is swung back to the vertical position with the fingers down and then immersed in a bath of rubber latex and is allowed to remain immersed for a sufficient period to exhaust the coagulating effect of all the calcium nitrate deposited, that is both the first dipped coating and the second coating. Depending on the strength of the coagulant and the composition of the latex bath, the dwell time in the latex bath may typically be from 0 to 80 seconds, exclusive of entry and withdrawal times.

After being withdrawn from the latex bath, the former is conveyed through conventional drying, leaching and vulcanising stations in order to complete the manufacturing procedure.

By this method gloves can readily be produced with a finger and hand wall thickness which gives the required sensitivity in use and is typically from 0.008 to 0.01 inch and with a cuff thickness of from 0.015 to 0.05 inch.

WHAT WE CLAIM IS:—

1. A process for making rubber gloves comprising areas of different thicknesses, which comprises dipping a glove former into a bath of rubber latex coagulant so as to coat the whole of the former with coagulant, removing the former and allowing the coagulant to dry, applying additional coagulant to the areas of the former corresponding to the glove areas in which increased thickness is required and allowing this coagulant to dry, the steps of applying additional coagulant and drying this coagulant being carried out while rotating the former about its longitudinal axis, and then dipping the whole former in a bath of rubber latex.

2. A process according to claim 1, in which the additional coagulant is applied to the wrist and gauntlet areas of the former.

3. A process according to claim 1, in which the additional coagulant is applied to the cuff area of the former.

4. A process according to any of claims 1 to 3, in which the additional coagulant is applied to the desired areas by spraying.

5. A process according to any of claims 1 to 3, in which the additional coagulant is applied to the desired areas by means of a brush or pad.

6. A process according to any of claims 1 to 5, in which the glove former is continuously moved through a first coagulant application station, a second coagulant application station, and a latex application station and, in sequence, is dipped, at the first coagulant application station, in the coagulant bath with the fingers of the former downwards, withdrawn from the coagulant, raised to bring the longitudinal axis of the former to an attitude between horizontal and vertical with the fingers upwards and rotated, in this attitude, about its longitudinal axis until the coagulant has dried, the additional coagulant is then applied, at the second coagulant application station, to the desired portions of the former while maintaining the former in said attitude and rotating it about its longitudinal axis, rotation of the former is continued until the additional coagulant has dried, the former is returned to its vertical position with the fingers downwards, dipped, at the latex application stage, in the latex bath, withdrawn from the latex, and raised to bring the longitudinal axis of the former to an attitude between horizontal and vertical with the fingers upwards and rotated about its longitudinal axis, in this attitude, until the latex has coagulated.

7. A process according to claim 1, substantially as herein described.

8. Rubber gloves when made by the process claimed in any of the preceding claims.

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